IRISH FISHERIES INVESTIGATIONS

SERIES A (Freshwater)

No. 13

(1973)

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CHRISTOPHER MORIARTY

STUDIES OF THE EEL *Anguilla anguilla* IN IRELAND.

2. IN LOUGH CONN, LOUGH GILL AND NORTH CAVAN LAKES.

Studies of the eel *Anguilla anguilla* in Ireland.

2. In Lough Conn, Lough Gill and North Cavan Lakes.

by

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(Received February 1, 1973).

ABSTRACT

A total of 843 immature eels of length 27 to 86 cm and ages 5 to 28 years were collected in summer by fyke netting, The North Cavan eels formed a distinct population of large, fast-growing eels, most of which matured before 12 years. The eels of the other lakes were slower in growth and in maturing, substantial numbers of 13 years and older being found. Principal food organisms in the Cavan eels were fish and chironomid larvae; in Lough Gill fish for eels of over 50 cm and *Gammarus* and Ephemeroptera larvae for smaller; in Lough Conn, Gastropoda for all sizes.

1. INTRODUCTION

The first paper in this series (Moriarty 1973) described the standard techniques used in studying the populations of resident, immature or "yellow" eels in Irish waters. The present paper gives the results of sampling in eight lakes and one portion of river in the northern part of the country. Loughs Gill and Conn lie on separate river systems while the North Cavan lakes investigated all lie on the River Erne or its tributaries. All of the river systems enter the Atlantic along 75 km of coast from north Mayo to south Donegal. (Fig. 1).

2. RESULTS

ERNE LAKES 1968 and 1972

The lakes of the Erne system in County Cavan form part of a maze of water and low hills where the River Erne flows through drumlin topography. In 1968 two lakes, Tullyguide and Eonish, in the region of Killashandra and three, Town Lake, Dromore and Drumlona, at Cootehill, were surveyed. In 1972 a number of lakes and a portion of the River Erne downstream of Belturbet were examined.

The nearest lake to the mouth of the Erne examined was part of Upper Lough Erne (National Grid Reference H 37 22), lying about 65 km upstream and separated from the sea by the great expanse of Lower Lough Erne, some 44 km in length. Lough Quivvy, of about 50 ha, is a nearby offshoot of Upper Lough Erne. Lough Drumard, of about 25 ha, is connected to Upper Lough Erne by a wide channel of about 1.5 km in length but has no substantial inflowing streams. The River Erne downstream of Belturbet is approximately 50 m in width.

In the Killashandra region Eonish Lake, 90 km from the sea, is a side branch of the River Erne with an area of 120 ha while Tullyguide, 32 ha, lies on a small tributary about 2 km distant from the main river. The Cootehill lakes lie 35 km upstream of Killashandra on a major tributary of the River Annalee, the Dromore River. Dromore Lake is simply a wide portion of this river, and Drumlona Lake forms a tributary to it. Town Lake lies at the head of a small stream which runs for 2 km through another small lake to the Dromore River. The geography of the lakes is shown in Figs. 1 and 2.

A relatively high alkalinity figure of 3.2 was recorded in Lough Quivvy in July 1972. The other waters varied from 1.3 to 2.4 with conductivities of 163 to 321. The nitrate level in Quivvy was 2.2 ppm and in the River Erne 2.7. Phosphate in the River was 0.07 ppm but was not detected in Quivvy when readings were taken in July. Details of the analyses are given in Table 1.

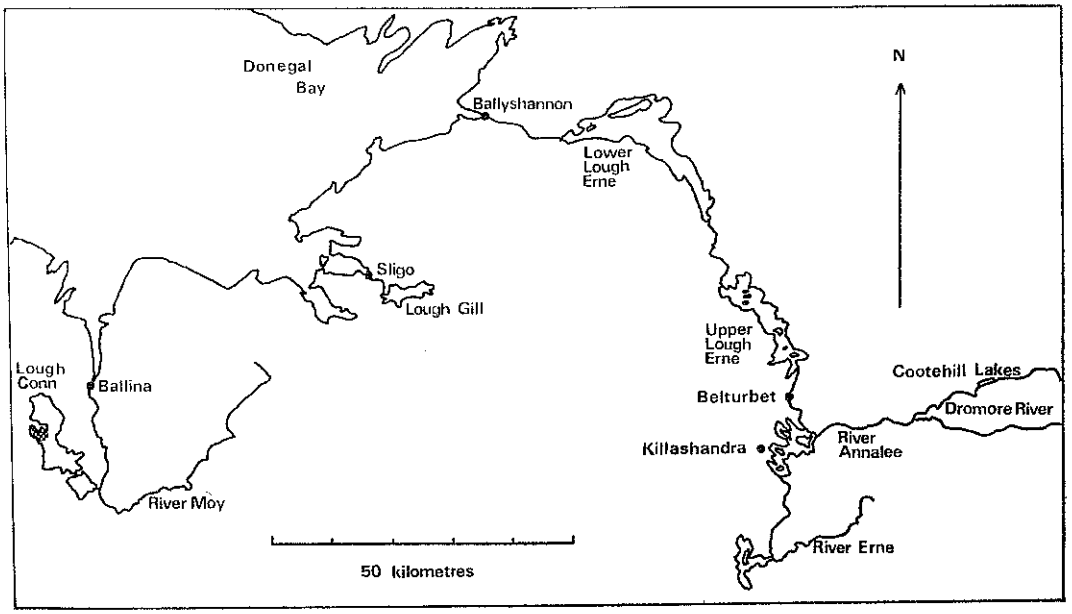

Figure 1. North Cavan lakes, Lough Gill and Lough Conn; sampling area in Lough Conn shaded.

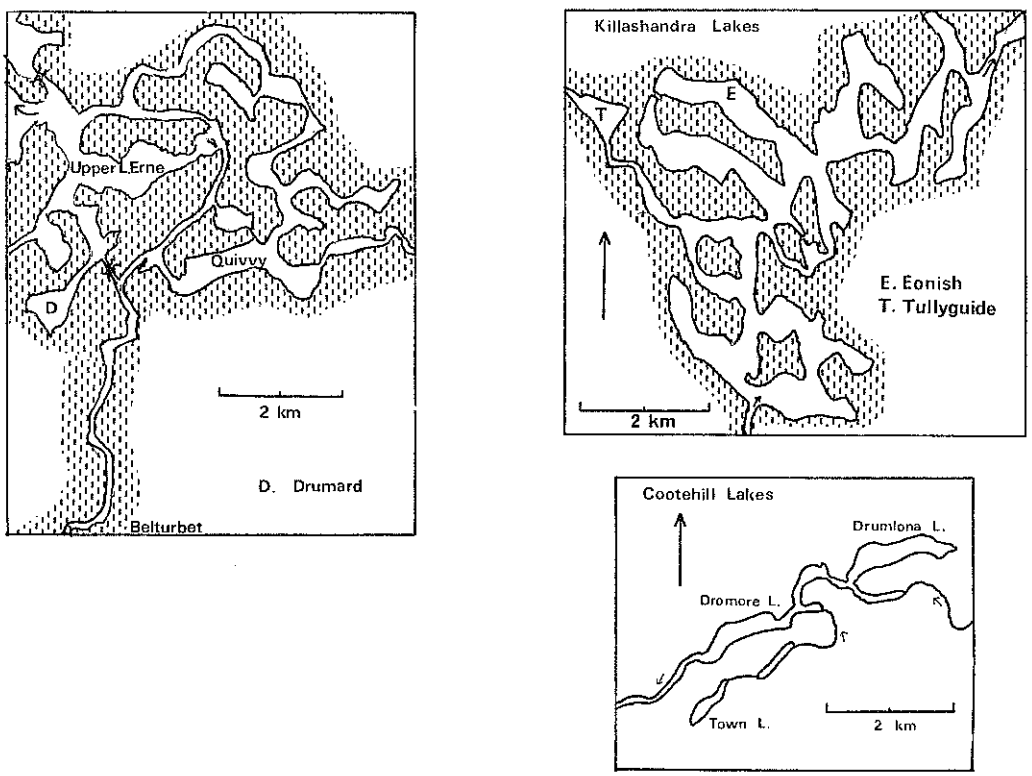

Figure 2. North Cavan lakes, surrounding land shaded. (Figs. 1 and 2 based on the Ordnance Survey by permission of the Government, Permit No. 1833).

Catch and Effort

All of the sampling in 1972 took place in water less than 3 m deep. Depths in 1968 were not recorded. Randon sampling positions in 1972 were selected by drawing a grid on the 1 : 1,0560 (six-inch) map, numbering the squares in order and using a table of random numbers to choose the squares. The 1968 season extended from July 4 to September 6. Sampling in 1972 took place from July 3 to 13.

Considerable variations occurred in the catch per unit of effort, details of which are given in Table 2. In the first week of the 1972 season (River Erne and Lough Quivvy) unit catches of 0.5 and 0.4 were made. One more sample was collected from Quivvy the following week and Upper Lough Erne was sampled at the same time. In each case substantially higher unit catches were made (1.1 and 1.5), comparable with the return from Eonish in 1968. Some of the nets used in this first week were new and the others had been in store for some time, following use in salt water. It is believed that the unexpectedly low catches resulted from the eels' entry being inhibited by the smell of the nets. After a week's use in fresh water, eels entered the nets at the usual rate.

The other waters from which catches of less than one per net were made were Drumard, Tullyguide and Town Lake, all of which lay at some distance off the main river and were fed largely by drainage water so that no strong currents flowed from them. The most dense population was found in Drumlona, a similar "blind alley" but larger and situated much closer to the main stream.

Length and weight

Small eels, less than 40 cm in length, were scarce in all parts. Large individuals, 60 to 75 cm were plentiful but only one of the 534 specimens measured was more than 80 cm long. The length distributions from each water were compared with each other using the chi-square test. No significant differences were found between any of the populations in the Belturbet and Killashandra regions. The scarcity of small eels from the Cootehill samples was statistically significant and the eels of Town Lake were significantly larger than those of Dromore and Drumlona. (The samples are therefore treated in three groups in Tables 3 and 4: *Erne* to include Upper Lough Erne, River Erne at Belturbet, Drumard, Quivvy, Eonish and Tullyguide Lakes; *Cootehill Lakes* to include Dromore and Drumlona while the *Town Lake* sample is treated on its own). Details of the length distributions are given in Table 3. Length/weight regressions computed for the 63 specimens of over 40 cm from Upper Lough Erne gave, in the equation $y = ax^b$, where y=length and x=age:

$$a=0.00059 \qquad b=2.74 \qquad s=0.108$$

Age Composition

Fifty-seven per cent of the otoliths were clear. On the basis of age distributions, all of the eels in the Belturbet and Killashandra regions belong to the same population while those from the Cootehill area were significantly older. The age/length equations show an apparently higher rate of growth for the downstream region. The eels grew rapidly and matured early, modal length groups being 9-10, with individuals of more than 12 years being scarce. Forty-two per cent of downstream eels, compared with 20% of Cootehill specimens, were less than 10 years. The mean length at ten years old was 51.5 ± 1.2 cm. Details are given in Table 4.

Food

The degree of fullness of the stomachs was recorded for the Erne waters but not for the Cootehill lakes. The frequencies of each of the categories: "empty", "food present" and "full" were compared for each size group within the lakes and for all sizes together between the lakes, using the chi-square test. No significant differences were found. The distinction between full and void hind guts was not made in 1968. All of the figures have therefore been treated in two groups in Table 5: Belturbet region and Killashandra region.

Chironomid larvae were the most frequent dominant organisms in the full stomachs, followed by fish, with a tendency for fish to be the most frequent in the larger eels and chironomids in the smaller. In the River Erne fish were dominant in four of the eight full stomachs while chironomids never were. In Drumlona four out of five were filled with *Phryganea* larvae. Cladocera, *Mysis, Gammarus, Bithynia, Anodonta* and *Asellus aquaticus* also occurred as dominants. Three hundred and forty-two individuals of *Asellus* filled the stomach of the biggest eel, a specimen of 86.5 cm. The dominant organisms are listed in Table 6.

On the basis of frequency of occurrence of the major groups of food organisms, no food preferences depending on size could be discerned. However, significant differences between some of the populations were

observed. Upper Lough Erne, Drumard, Quivvy and Tullyguide had similar preferences. *Mysis relicta* was present in 74% of the Eonish stomachs. In Eonish, Dromore and the River Erne, fish were more frequent than elsewhere; in Drumlona gastropods were found in over 90% of the stomachs but in 29% or fewer elsewhere and in the River fewer chironomids were found than in any of the still waters. Details are given in Table 7.

The full list of organisms (Table 8) totalled 41 varieties from 211 stomachs. Four of these were recorded from all of the waters, namely Chironomid larvae and pupae, *Asellus* and perch. Chironomids were the most important items in all cases except the River and the Cootehill lakes. A large *plumosus* form was particularly abundant. *Asellus* was found in only 15% of the stomachs but was usually present in rather large quantities when it did occur. Perch were found in more than half of the Dromore eels and were eaten greedily by the few eels which were found to contain them elsewhere. Seventy-six fry of 22 to 28 mm length were found in a 58 cm eel and constituted 3% of its body weight.

The most striking feature of the food analysis was the dominance of chironomids in the Erne lakes; present in more than half the stomachs, they were much more frequent than any of the other organisms. The next in order of frequency were *Asellus* (15%), the free-living trichopteran *Cyrnus trimaculatus* and the small case-builder *Athripsodes cinerea*. Perch, gudgeon and one or more cyprinids, probably small roach or bream, and *Anodonta* were found in about 5% of the stomachs and, on account of their relatively large size, were important items wherever they occurred. Gastropods and ephemeropterans were scarce and of little importance taking the system as a whole.

The food in the river eels was very varied, with fish the only group of particular importance. Eonish was remarkable for the frequency with which *Mysis relicta* occurred, being found in 60% of stomachs there and none elsewhere. This lake may have been deeper than the others but no details were available. In the Cootehill lakes perch fry were very important, while chironomids played only a small part. Drumlona was an especially interesting lake. The eel population density was more than double that of any of the other waters and the food was distinctly different. In particular the large trichopteran *Phryganea* was present in more than half the stomachs, as were *Asellus aquaticus* and the snail *Lymnaea peregra*. It seemed possible that the dense eel population was attracted to the lake by an unusual fauna for the region.

Eleven flowering plant fruits, probably of a species of *Ranunculus*, were found in the stomach of an eel from the River Erne. Each was oval, measuring about 5 x 3 mm. While traces of filamentous algae and other plant matter have been found in eel stomachs this was the first occasion when there could be no doubt that the eel had purposely swallowed the fruits, rather than taking in plant material to which prey animals had been attached.

LOUGH GILL July 1972

Lough Gill, like Lough Conn and many of the large west of Ireland lakes, lies at the junction of acid metamorphic rock with Carboniferous limestone. The north, east and west shores of Gill are bordered by Upper Carboniferous strata while the metamorphics lie to the south. The lake drains into the River Garvogue which runs for four km to the sea in Sligo town. Nitrate and phosphate levels of 4.0 and 0.19 ppm in July were rather high.

Catch and effort

Fishing took place at random positions in water less than 3 m deep around the lake shore and off the larger islands. Thirteen trains of eight nets, set in the shallows, caught 122 eels, a unit catch of 1.2. Five trains, in water from 3 to 25 m in depth, caught only two eels, suggesting that the population at the time of sampling was concentrated in the shallows. Water temperatures were high, at 19.5 to 20°C over the sampling period, July 19 to 23.

Length, weight and age

The length distribution is given in Table 3. Over 60% of the sample were between 30 and 40 cm and a further 25% lay between 40 and 45 cm. Large eels were thus extremely scarce, only six individuals of over 60 cm being found in the sample of 124.

On account of the very large proportion of small eels it was necessary to take a sub-sample of these in computing a length/weight regression. This was done by recording the weight of the first eel taken in each

1 cm group for specimens from 40 to 49 cm, namely the first 40 cm, first 41 cm etc. The measurements of all ten specimens of over 50 cm which were weighed were also used. The values computed for a sample of 20 specimens were:

$$a=0.0058,\quad b=2.83,\quad s=0.073,$$

figures closely comparable with those from the Erne.

Twenty-three per cent of the otoliths were clear. The eels were slow-growing, mean length at ten years being 41.2 ± 1.3 cm. The modal age group was 9-10 years and the youngest eel taken was seven. Eels of over 12 years made up 20% of the catch, the decline in numbers coinciding with recruitment to the intensive long-line fishery rather than indicating age at maturity. Details of age and length are given in Table 4.

Food

No significant differences were observed between the rates of feeding of the various size groups. Twenty-seven per cent of the stomachs were empty and 29% full (Table 5). Fish were eaten by a significantly greater proportion of large eels (50-72 cm) than by small (30-40 cm), with the intermediate size group lying in between. Invertebrate feeding appeared to be unusual in the large eels but the sample (of seven) was too small to allow firm conclusions. On the basis of frequency of occurrence (Table 7) Trichoptera, Ephemeroptera and *Gammarus* were the most important food items for eels of less than 50 cm with fish the main diet for the larger ones. *Ephemera danica, Gammarus* and fish were the usual dominant organisms in the full stomachs (Table 6).

The full list of food organisms (Table 9) totalled 35 from 65 stomachs. Five species of Ephemeroptera were identified, with *E. danica* the most important. Two species of *Caenis* were frequent and two forms, *Ecdyonurus* and *Ephemerella,* were unexpected, being usually associated with rivers rather than lakes (Macan 1970). Thirteen species of Trichoptera were identified, the free-living genera *Polycentropus* and *Cyrnus* were the most frequent. The small case-building leptocerids were also frequent but species of *Limnephilus* were scarce. Chironomid larvae were important as food items but less so than *Gammarus* and the *Trichoptera.* The fish identified were eel, rudd, gudgeon and perch.

LOUGH CONN August 1972

The southern portion of Lough Conn lies in metamorphic rocks, the northern two thirds in Lower Carboniferous limestone. The lake is a side-branch of the River Moy, approximately 25 km from the sea in Ballina. The water is clear, with an alkalinity of 1.9, conductivity 234. Nitrate and phosphate levels have been monitored by the Inland Fisheries Trust and range from 0.03 to 0.625 and trace to 0.04 respectively, all figures in parts per million.

Catch and effort

Unsettled weather limited the sampling area to sheltered and shallow waters to the south of the Errew peninsula (Fig. 1). Three trains of eight nets were set on the nights of August 1 and 2, giving a total effort of 48 net days and catch of 84. The unit catch of 1.8 eels was relatively low.

Length, weight and age

The length distributions (Table 3) showed a marked scarcity of large eels, none greater than 59 cm being found and only 8% longer than 50 cm. The 30-40 cm group (including one individual of 27 cm) was the largest, contributing 63% of the catch while 29% lay between 40 and 50 cm. As in the case of Lough Gill, the length/weight regression was computed for a sub-sample of eels in the 40-50 cm group, consisting of the first specimen in each 1-cm group. The values computed for a sample of sixteen were:

$$a=0.029,\quad b=2.4,\quad s=0.063,$$

giving a rather low value for b, possibly explained by the absence of large specimens.

The eels were slow-growing and otoliths were difficult to read, only 23% being clear. The mean length at ten years, from the age/length regression (Table 4) was 40 ± 0.8 cm. The modal age group was 9-10 and the youngest eel taken was seven years old. Eels of over 12 years made up only 13% of the sample and, as in the case of Lough Gill, the decline in numbers of older eels is taken to have been caused by the long-line fishery. Details of age and length are given in Table 4.

Food

No significant differences were observed between the rates of feeding of the various size groups. Twenty-four per cent of the stomachs were empty and 27% full (Table 5). Gastropoda were the most important food items. *Lymnaea peregra* was the dominant organism in eight of the sixteen full stomachs and *Bithynia* in a ninth. Gastropods, mainly *L. peregra* were found in 56% of the stomachs. *Asellus* and *Ephemera* accounted for three and two of the remaining full stomachs and these, together with *Gammarus*, Trichoptera and Chironomids were regular constituents of the stomach contents (Table 6 and 7). Fish were infrequent in the stomachs, present in only 5% of all sizes.

The full list of organisms totalled 29 from 63 stomachs (Table 9). Both species of *Asellus* (*aquaticus* and *meridianus*) were frequent and eaten in substantial numbers. *Gammarus duebeni* was also important and *G. lacustris* occured once. *Ephemera danica* was an important item but other Ephemeroptera were very scarce. Of the Trichoptera, while eleven species were identified, only the Leptocerids were plentiful.

SUMMARY

1. This paper is the second in a series on the biology of immature eels in Irish waters and gives the results of the examination of fyke-net samples from Lough Conn, Lough Gill, Co. Sligo and a number of lakes in north Co. Cavan on the Erne river system. Sampling took place from July to early September. Catches per unit of effort were relatively low in all cases, mostly between 1.0 and 1.8 but higher, at 3.3 in Drumlona Lake, near Cootehill, 125 km from the sea. Such a high cncentration of eels so far upstream was most unusual and may have indicated peculiar feeding conditions. Exceptionally low catch figures for the first week of operations in the Cavan lakes in 1972 suggested that the eels had been kept away by the smell of the nets, some of which were new and unused and others being used for the first time after a period in salt water.

2. Observations of lengths and ages showed that the Erne System eels belonged to a different population from those in other Irish fresh waters investigated to date. The Erne eels grew rapidly, mean length at ten years being 51.5 cm at which age eels from other waters were approximately 40 cm. The Erne eels apparently matured earlier, few of more than 12 years and none of more than 16 being captured, while older specimens occurred regularly in the other waters. More than 80% of the Lough Conn and Lough Gill eels were less than 45 cm in length while more than 60% of the Erne System eels were longer. It is believed that the scarcity of large eels in Conn and Gill resulted from overfishing.

3. Eels of all sizes in the Erne System fed on a mixed diet of invertebrates and fish, with chironomids the most important invertebrates. In Lough Gill eels of over 50 cm specialised in fish while several invertebrates, especially *Gammarus duebeni* and *Ephemera danica* were the principal items in the diet of the smaller individuals. In Lough Conn gastropods, especially *Lymnaea peregra* and *Bithynia tentaculata* were the most important food organisms for eels of all sizes.

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Table 1. Chemical analyses.

	Alkalinity m Eq per 1	Conductivity reciprocal megohms per cm	Nitrate ppm	Phosphate ppm
River Erne	1.4		0.6	0.07
Quivvy	3.2		0.5	nil
Eonish	1.7	189		
Tullyguide	1.35	216		
Town Lake	2.4	321		
Dromore	1.3	163		
Drumlona	1.5	171		
Gill	1.9	207		
Conn	1.9	234	0.03 — 0.625	Trace — 0.04

Table 2. Catch and effort.

Position	Date	Effort net days	Unit catch	Total catch
	1972			
Upper L. Erne	July 12—13	48	1.5	73
Drumard	12	24	0.9	21
Quivvy	4— 7	48	0.4	17
„	13	24	1.1	27
River Erne	3— 7	80	0.5	40
	1968			
Eonish	July 18 — August 2	96	1.4	134
Tullyguide	July 4 — 17	80	0.5	40
Dromore	August 20 — September 2	112	1.2	136
Town Lake	August 6 — 19	72	0.6	44
Drumlona	September 3 — 6	32	3.3	105
	1972			
Gill	July 19 — 23	104	1.2	122
Conn	August 1 — 2	48	1.8	84

Table 3. Length distributions, in cm to nearest whole number downwards (percentage of *n*).

Position	25—34	35—39	40—44	45—49	50—59	60—69	70—86	*n*	$\bar{x}$	SE
Erne	4	14	21	17	24	17	3	272	49.5	0.64
Cootehill	1	2	19	25	40	12	1	220	50.7	0.50
Town Lake		2	10	12	38	33	5	42	56.6	1.36
Gill	16	45	21	7	6	4	1	124	40.6	0.69
Conn	17	46	21	8	8	0	0	84	39.6	0.65

Table 4. Length and age data.

Position	Numbers	Age	%	Length (cm) Minimum	Maximum	Mean	SE
Erne	233						
		5— 6	6	35	52	41.6	1.3
		7— 8	36	30	63	43.5	0.7
		9—10	37	37	75	50.4	1.0
		11—12	18	35	71	60.2	1.4
		13—14	3	47	86	63.5	4.0
Cootehill	205						
		5— 6	2	40	47	42.5	1.4
		7— 8	18	40	68	46.9	1.1
		9—10	45	39	70	51.1	0.7
		11—12	30	40	66	52.0	0.8
		13—14	4	49	64	56.0	2.2
		15—16	1	54	65	59.5	5.5
Gill	95						
		7— 8	6	34	38	35.5	0.6
		9—10	38	32	44	37.5	0.5
		11—12	35	31	62	40.5	1.1
		13—14	13	36	63	43.8	2.3
		15—16	6	37	67	53.8	4.6
		17—28	2	65	72	68.5	3.5
Conn	78						
		7— 8	19	27	44	36.4	1.05
		9—10	37	29	46	37.2	0.79
		11—12	27	34	50	40.1	1.19
		13—14	14	32	58	44.1	2.39
		15—16	3	51	59	55.0	

Values in length/age regression $y=cx+d$:

	Numbers	*c*	*d*	r	s	length range (cm)
Erne	52	4.05	11.0	0.81	8.3	30—86
Cootehill	41	1.89	34.2	0.36	10.1	34—66
Gill	31	2.29	18.4	0.76	7.3	31—72
Conn	26	2.94	11.3	0.86	4.1	31—59

Table 5. Fullness of stomachs (% of *n*).

	Empty		Partly filled	Full	*n*
	Hind-gut void	Hind-gut full			
Killashandra lakes	21		66	13	85
Belturbet lakes	10	15	53	22	153
Lough Gill	13	14	44	29	91
Lough Conn	10	14	49	27	83

Table 6. Dominant food in full stomachs.

	Gammarus	*Ephemera*	Chironomid	Gastropoda	Fish	Others	Numbers of stomachs with food
Erne Lakes	1	0	10	0	5	Cladocera 1 *Anodonta* 1 Invertebrates 3	111
River Erne	0	0	0	1	4	*Asellus* 2 Invertebrates 1	21
Eonish	0	0		0	0	*Mysis* 2 *Asellus* 2	50
Dromore	0	0	1	0	3	*Phryganea* 1	18
Drumlona	0	0	0	1	0	*Phryganea* 4	11
Gill	7	7	0	0	6	*Asellus* 1 Trichoptera 2	66
Conn	1	2	0	9	1	*Asellus* 3 Diptera pp 1 Invertebrates 1	63

Table 7. Occurrences of major food items (% of *n* where *n*=number of stomachs containing food).

	Mysis	*Asellus*	*Gammarus*	Ephemeroptera	Trichoptera	Chironomidae	Gastropoda	*Anodonta*	Fish	*n*
Erne Lakes		17	5	10	30	80		7	14	81
River Erne		47	12	6	59	12	29		65	17
Eonish	74	7		10	21	64	7		45	42
Dromore		11			39	33	11		56	18
Drumlona		27			55	27	91		18	11
L. Gill										
30—40 cm		23	37	49	63	9	23	2	7	43
40—50 cm		19	37	37	44	25	12		19	16
50—72 cm			14		14				71	7
L. Conn		22	32	27	40	30	56	5	5	63

Table 8. Food organisms, Erne System.

	Numbers of stomachs containing organisms					Individuals per stomach	
	Erne lakes	River	Eonish	Dromore	Drumlona	Range	Mean
Helobdella stagnalis	2					1— 2	1.5
Erpobdella octoculata	6					1— 36	8.5
Cladocera	4					11—244	87.5
Argulus sp.			2			1	1.0
Asellus aquaticus	14	7	2	2	6	1—342	40.3
Gammarus duebeni	4	2				1— 82	18.6
Mysis relicta			30			1—488	32.7
Ephemera danica	2		4			1— 4	1.3
Caenis moesta	2					1— 4	2.5
Other Ephemeroptera	4					1	1.0
Callicorixa praeusta			1			1	1.0
Colepotera lv	2	1				1— 2	1.3
Neureclepsis bimaculata		1				1	1.0
Polycentropus flavomaculatus	3	1				1— 6	2.0
Cyrnus flavidus	2			3		1— 3	1.8
C. trimaculatus	12	5	1			1— 33	5.5
Phryganea spp.	2	1		7	6	1— 24	7.7
Limnephilus decipiens	6	4				1— 39	9.3
L. flavicornis	2					1	1.0
L. marmoratus		1				2	2.0
Anabolia nervosa	3	4				1— 2	1.3
Athripsodes cinerea	11					1— 5	1.2
Mystacides longicornis	1					12	12.0
Ocetis ochracea			3			1— 2	1.3
Chironomid lv	53	4	27	5	1	1— 32	15.5
Chironomid pp	40	3	29	7	1	1—105	9.0
Other Diptera lv	2	3				1	1.0
Valvata piscinalis				1		1	1.8
Potamopyrgus jenkinsi		1	1	1	2	1— 4	8.3
Bithynia tentaculata		4	3			1— 24	1.0
Lymnaea stagnalis					2	2— 8	5.0
L. peregra			1	1	6	1— 35	8.1
Planorbis carinatus		1				2	2.0
P. albus	5					1	1.0
Anodonta	5					1	1.0
Bivalve (1-3 mm)	2					4— 18	11.0
Bivalve (4-7 mm)		1					—
Unidentified fish	7	5				1— 21	—
Gudgeon	1	1				1	1.0
Other cyprinids		3				1	1.0
Perch	6	2	18	10	3	1— 76	5.1
Ranunculus sp. fruit		1				11	111.0
Total food items	26	25	13	18	10	42	
Total stomachs with food	111	21	50	18	11	211	

Table 9. Food organisms, Lough Gill and Lough Conn.

	Lough Gill	Individuals per stomach		**Lough Conn**	Individuals per stomach	
	Numbers of stomachs	Range	Mean	Numbers of stomachs	Range	Mean
Piscicola geometra				1	3	3.0
Erpobdella octoculata				1	3	3.0
Cladocera	4	1— 9	3.8	1	1	1.0
Asellus aquaticus	13	1— 24	7.9	12	1— 68	19.8
A. meridianus				6	1— 52	18.7
Gammarus lacustris	1	3	3.0	1	16	16.0
G. duebeni	23	1— 65	10.7	18	1— 84	6.2
Plecoptera lv	1	3	3.0			
Ephemera danica	15	1— 9	2.2	14	1— 5	2.0
Caenis moesta	9	1— 5	2.0	1	1	1.0
C. horaria	2	1	1.0			
Ephemerella ignita	3	1— 12	5.3			
Ecdyonurus venosus	1	1	1.0			
Heptagenia sulphurea				1	1	1.0
Other Ephemeroptera	9	1— 21	3.7	3	1	1.0
Polycentropus kingi	2	1	1.0			
P. flavomaculatus	13	1— 59	8.3	3	1	1.0
Cyrnus flavidus	3	1	1.0	1	1	1.0
C. trimaculatus	12	1— 8	2.9	1	1	1.0
Hydropsyche sp.				2	1— 2	1.5
Limnephilus vittatus	4	1— 4	1.8			
L. decipiens	2	1	1.0			
L. flavicornis	1	1	1.0			
Limnephilus sp.				2	1	1.0
Athripsodes cinerea	8	1— 12	3.3	12	1— 21	4,5
Mystacides longicornis	8	1— 47	8.7	6	1— 3	1.8
M. azurea	5	1— 8	2.4	12	1— 72	6.0
Ocetis ochracea	4	1— 16	8.3	5	1— 6	2.0
Lepidostomum hirtum	2	1— 4	2.5	8	1— 5	2.2
Molanna sp.	3	2— 8	4.7			
Other Trichoptera lv				5	1— 15	3.8
Trichoptera pp	2	1	1.0	1	23	23.0
Chironomidae lv	19	1— 29	3.7	14	1— 13	2.2
Chironomidae pp	5	1— 34	9.8	20	1— 50	6.7
Chaoborus lv				3	1— 4	3.0
Other Diptera	6	1	1.0			
Winged insects	3	1— 2	1.7			
Hydracarina				2	1	1.0
Theodoxus fluviatilis				3	2— 18	8.7
Valvata piscinalis	4	1— 5	2.3	3	1— 2	1.3
Potamopyrgus jenkinsi	2	1	1.0	4	1— 2	1.5
Bithynia tentaculata	4	1— 5	2.0	14	1— 27	4.6
Lymnaea peregra	3	1— 4	2.0	24	1— 29	8.4
Acroloxus lacustris				1	1	1.0
Planorbis albus	1	1	1.0			
Anodonta sp.	1	1	1.0	3	1	1.0
Bivalve (1—3 mm)	1	69	69.0	18	1— 85	10.5
Bivalve (4—7 mm)				13	1— 22	4.2
Fish	7	1	1.0	3	1	1.0
Eel	2	1	1.0			
Rudd	1	1	1.0			
Gudgeon	1	1	1.0			
Cyprinid egg	1	1	1.0	3	1— 20	7.3
Perch	1	1	1.0			
Total food items	35			29		
Total stomachs with food	65			63		